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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,761	01/28/2005	Geir Westgaard	03438.0111-00000	9301

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EXAMINER	
BROOME, SAID A	
ART UNIT	PAPER NUMBER
2628	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,761	WESTGAARD ET AL.	
	Examiner	Art Unit	
	Said Broome	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15,16 and 18-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15,16 and 18-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed on 1/11/2007.

2. Claims 1-13, 15, 16 and 18-26 have been amended by the applicant.

3. Claims 14 and 17 have been cancelled by the applicant.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-12, 15, 16 and 18-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 1 recites: "A method for creating an irregular mesh…", claim 6 recites "outputting said geometric description for representation" and claim 18 recites "A method for arranging data in order to describe an irregular mesh…", however no tangible result is produced. Therefore, the claimed invention does not posses "real world" value, and instead represents nothing more than a methods of creating and arranging data in order to describe an irregular mesh and a method arranging data in order to describe an irregular mesh comprising creating data structures. Therefore due to the lack of a concrete tangible result in claims 1, 6 and 18, as well as failure to present support in the Specification for a tangible result, the claims 1-12, 15, 16 and 18-26 are non-statutory. The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite

more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application."). In State Street, the Federal Circuit examined some of its prior section 101 cases, observing that the claimed inventions in those cases were each for a "practical application of an abstract idea" because the elements of the invention operated to produce a "useful, concrete and tangible result." State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. For example, the court in State Street noted that the claimed invention in Alappat "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced 'a useful, concrete and tangible result'—the smooth waveform." Id. Similarly, the claimed invention in Arrhythmia "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete and tangible thing—the condition of a patient's heart."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 and 6-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunnett et al.(hereinafter referred to as "Dunnett", US Patent 7,027,050) in view of Levy et

al.(hereinafter referred to as "Levy", "*Cellular Modeling in Arbitrary Dimension using Generalized Maps*").

Regarding claim 1, Dunnett teaches receiving topological input data in column 7 lines 8-9 ("*The 3D modelling data at step S2 may be input to computer 2 on a storage medium…*"), in which the input data represents vertices and faces of the mesh, as described in column 12 lines 53-57 ("*…this database stores information about each triangle in each model, particularly about the edges and vertices of each triangle…*"). Dunnet also teaches a mesh surface containing a portion of the surface mesh rendered using a parametric surface, as described in column 2 lines 27-32, in which different parts of the complex surface would be rendered using different tessellated surfaces therefore the mesh surface is an irregular surface. Dunnett illustrates associating coordinates in space with the vertices of the mesh in Figure 10 where it is shown that vertices of the mesh have a corresponding coordinate. Dunnett teaches creating a geometric description in column 16 lines 54-58 ("*…to refine each triangular polygon in the model…which more accurately represent the object surface.*"), where it is described that a representation of a refined mesh model surface is generated, therefore refinement of an irregular mesh model as illustrated in Figure 23A, would provide a geometric representation that describes the refined surface. Dunnett illustrates creating a refined mesh based on the irregular mesh and the coordinates, in Figure 2, where it shown in step s16 that the irregular mesh model is refined based on the input topological data that comprises the coordinates and vertices of the mesh, as shown in step s6 and in Figure 23B. Dunnett teaches using coordinates associated with the vertices, as shown in Figure 10, of the refined mesh, as described in column 16 lines 54-58 ("*…to refine each triangular polygon in the model of an object into a larger number of smaller*

triangles which more accurately represent the object…") to compute control points, as described in column 12 lines 46-47 ("*Control points 90, 96 and 102 are located at the triangle vertices.*"), and using the control points to create surface patches associated with the first mesh in column 12 lines 43-46 ("*…control points are used to calculate the ordinates which define a cubic Bernstein-Bezier triangular patch…*"). However, Dunnett fails to teach creating a G-map representation of the topology of the mesh based on the input data. Levy teaches creating a G-map representation of the topology a mesh in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects…*"), therefore it one of ordinary skill would have been capable of utilizing any arbitrary topology data to construct a G-map representation, such as the input topology data taught by Dunnett. Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Dunnett with Levy because this combination would provide an improved representation of a surface of arbitrary topology by representing the refined mesh surface using generalized maps.

Regarding claims 2 and 7, Dunnett teaches the refined mesh is created by applying a mesh refinement algorithm in column 16 lines 54-58 ("*…to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object…*"), and where each patch of the first mesh is created as a surface spline associated with a quad of the first mesh, in column 32 lines 1-5 ("*…each object may be modelled using other forms of polygons and patches other than triangular patches may be used to refine each polygon…each object may be modelled using rectangles.*"), where it is described that the surface of the mesh may be represented as a rectangular patch or quad.

Regarding claims 3 and 8, Dunnett fails to teach the limitations. Levy teaches creating a G-map comprises the steps of creating a set of darts each associated with one vertex and one face of the first mesh in the caption of Figure 6 ("*...the aim is to retrieve the darts corresponding to the same 0-cell (vertex), 1-cell (edge) and 2-cell (face) as d.*"), where it is described that one vertex and face associated with a dart is determined. Levy illustrates creating a number of involutions that establish associations between pairs of darts so that an α_0 involution links two darts associated with adjacent vertices but the same face, creating an edge, an α_1 involution links two darts associated with the same vertex and the same face, and an α_2 involution links two darts associated with the same vertex but adjacent faces, linking two adjacent faces in Figures 4A, 4B and 4C respectively were the respective relationships between the involutions and their pair of darts as shown, as described in section 3.2 second paragraph lines 6-10 ("*...the function α_0 connects each pair of darts shown in Figure 4-A, i.e. for such a pair (d1; d2)...The function α_1 connects each pair of darts shown in Figure 4-B and the function α_2 connects each pair of darts shown in Figure 4-C.*"). The motivation to combine the teachings of Dunnett with Levy is equivalent to the motivation of claim 1.

Regarding claims 4 and 9, Dunnett teaches a local refinement of the first mesh is created by defining a second mesh in column 16 lines 54-58 ("*...to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object...*"), where it is described that a refinement of the mesh is defined, thereby resulting in a second subdivided mesh surface. Dunnett also teaches corresponding with one or more quads of the mesh and subdividing the quads of the first mesh into smaller quads of the second mesh in column 32 lines 1-5 ("*...each object may be modelled using other forms of polygons and patches*

other than triangular patches may be used to refine each polygon…each object may be modelled using rectangles."), where it is described that the surface of the mesh maybe represented using rectangular regions, or quad, in which the refinement of the mesh would therefore represent smaller quad regions of the mesh. Dunnett fails to describe the topology of the second mesh with a second G-map representation. Levy teaches described the topology of a mesh of arbitrary topology in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects…*"), therefore the topology of the refined mesh, as taught by Dunnett, would be capable of a G-map representation provided by Levy.

Regarding claim 6, Dunnett illustrates an input interface for receiving topological input data representing vertices and faces of the mesh in column 7 lines 14-16 ("*…the 3D modelling data may be generated in computer 2 using a commercially available modelling package and instruction from a user via user input device 14.*"), in which the input data represents vertices and faces of the mesh, as described in column 12 lines 53-57 ("*…this database stores information about each triangle in each model, particularly about the edges and vertices of each triangle…*"). Dunnett illustrates a computer system 2 containing a processing means 4 in Figure 1. Dunnett illustrates associating coordinates in space with the vertices of the mesh in Figure 10 where it is shown that vertices of the mesh have a corresponding coordinate. Dunnett teaches creating a geometric description, or topology, from the mesh in column 7 lines 52-54 ("*…CPU 4 constructs and stores a topology database for each model of each object.*") and in column 6 lines 65-67 ("*…three-dimensional modelling data defining one or more objects…This data comprises a polygonal mesh model…*") and, where it is described that a topology of the mesh is

constructed. Dunnett illustrates creating a refined mesh based on the first mesh and the coordinates, in Figure 2, where it shown in step s16 that the mesh model is refined based on the input topological data that comprises the coordinates and vertices of the mesh, as shown in step s6. Dunnett teaches using coordinates associated with the vertices, as shown in Figure 10, of the refined mesh, as described in column 16 lines 54-58 ("*...to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object...*") to compute control points, as described in column 12 lines 46-47 ("*Control points 90, 96 and 102 are located at the triangle vertices.*"), and using the control points to create surface patches associated with the first mesh in column 12 lines 43-46 ("*...control points are used to calculate the ordinates which define a cubic Bernstein-Bezier triangular patch...*"). However, Dunnett fails to teach creating a G-map representation of the topology of the mesh based on the input data. Levy teaches creating a G-map representation of the topology a mesh in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects...*"), therefore it one of ordinary skill would have been capable of utilizing any arbitrary topology data to construct a G-map representation, such as the input topology data taught by Dunnett. Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Dunnett with Levy because this combination would provide an improved representation of a surface of arbitrary topology by representing the refined mesh surface using generalized maps.

Regarding claims 11-13, Dunnett teaches a computer system containing various processing means comprises a combination of computer program instructions and general

purpose hardware in column 38 lines 7-10 ("*...processing is performed by a computer using processing routines defined by programming instructions. However, some, or all, of the processing could be performed using hardware.*").

Regarding claims 14-17, Dunnett teaches a computer readable medium in column 7 lines 8-13 ("*The 3D modelling data at step S2 may be input to computer 2 on a storage medium, such as disk 10, via disk drive 8, may be transmitted to computer 2 via a communication network such as the Internet, for example from another computer or a database...*"), such as a disk or CD-ROM, magnetic storage or hard disk, or a signal transmitted over the Internet.

Response to Arguments

Applicant's arguments with respect to claims 1-13, 15, 16 and 18-26 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues the 35 U.S.C. 101 rejection of claims 1-13, 12, 15, 16 and 18-26. Regarding claim 1, the applicant states that the "geometric description" is a tangible result for creating and displaying geometric objects as output on a display, however creation of a geometric description does not provide a tangible result, therefore the claim is directed towards an abstract idea of generating the geometric description and not actually displaying the generated description. Therefore claims 1-5 are rejected under 35 U.S.C. 101.

In regards to claim 6, the applicant argued that the claim recited a tangible result of: "outputting said geometric description for representation on a display", however due to the failure to present support in the Specification for the tangible result, the claims 6-12, 15 and 16 are therefore non-statutory, and are rejected under 35 U.S.C. 101. Claim 18 recites "A method

for arranging data...", however no tangible result is produced, and therefore claims 18-26 are rejected under 35 U.S.C. 101.

The applicant also argues the 35 U.S.C. 101 rejection of claims 11-17. However, the rejection of claims 11-13, 15 and 16, for claiming just a computer program, has been withdrawn due to the amendments to claim 11 that recites: "a computer readable medium, wherein the program instructions are encoded on the computer-readable medium" and to claim 13 that recites: "A computer readable medium that stores a set of instructions".

The applicant argues that the references Dunnett and Levy used in the 35 U.S.C. 103(a) rejection of claim 1 do not teach an irregular mesh. However, the examiner maintains the rejection because Dunnet illustrates refining an irregular mesh of Fig. 23A in Fig. 23B. The applicant also argues that the references fail to teach creating a G-map representation of the topology of an irregular mesh. However, Levy teaches creating a G-map representation of an irregular mesh in the table shown in the Conclusions section ("...*Surfaces with arbitrary polygons, Volumes with arbitrary polyhedra...*"), which describes that G-maps represent surfaces with arbitrary polygons, therefore the surfaces provide an irregular mesh, as shown on Page 11 in Figures G and H. The applicant also argues that the references do not teach associating coordinates in space with the vertices of the irregular mesh. However, Dunnett illustrates associating coordinates in space with the vertices of the mesh in Figure 10 where it is shown that vertices of the mesh have an associated coordinate in space. The applicant also argues that the references do not teach creating a geometric description from the irregular mesh. However, Dunnett teaches creating a geometric description from the mesh in column 16 lines 54-58 ("...*to refine each triangular polygon in the model...which more accurately represent the*

object surface."), where it is described that a refined representation of a mesh model surface is generated, therefore refinement of an irregular mesh model as illustrated in Figure 23A, would provide a refined geometric representation that describes the mesh surface. The applicant also argues that the references do not teach creating a refined mesh based on the irregular mesh and the coordinates. However, Dunnett illustrates creating a refined mesh based on the irregular mesh and the coordinates, in Figure 2, where it shown in step s16 that the irregular mesh model is refined based on the input topological data that comprises the coordinates and vertices of the mesh, as shown in step s6 and in Figure 23B. The applicant also argues that the references do not teach using coordinates associated with the vertices to compute control points. However, Dunnett teaches using coordinates associated with the vertices, as shown in Figure 10, of the refined mesh described in column 16 lines 54-58 ("*...to refine each triangular polygon in the model ...*"), to compute control points described in column 12 lines 46-47 ("*Control points 90, 96 and 102 are located at the triangle vertices.*"), where it is described that the triangles comprising the mesh contains control points, therefore control points of the vertices of the mesh would be calculated during refinement of the mesh.

The applicant argues that the references Dunnett and Levy used in the 35 U.S.C. 103(a) rejection of claim 2 do not teach the refined mesh is created by applying a mesh refinement algorithm, and where each patch of the first mesh is created as a surface spline associated with a quad of the first mesh. However, Dunnett teaches the refined mesh is created by applying a mesh refinement algorithm in column 16 lines 54-58 ("*...refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object...*"), and where each patch of the first mesh is created as a surface spline associated

with a quad of the first mesh, in column 32 lines 1-5 ("*...each object may be modelled using other forms of polygons and patches other than triangular patches may be used to refine each polygon...each object may be modelled using rectangles.*"), where it is described that the surface, which may be a spline or parametric surface as described in column 3 lines 46-49 ("*The invention also comprises a processing method or apparatus in which a parametric surface patch is defined for at least some of the polygons making up a model of a curved surface...*"), may be represented as a rectangular patch or quad, as shown in Figure 32.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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3/27/07 SB

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